

- Henderson, H. E. 1938. The cercaria of *Crepidostomum cornutum* (Osborn). *Trans. Amer. Microsc. Soc.* **57**: 165-172.
- Hoffman, G. L. 1955. Notes on the life cycle of *Bunodera eucaliae* Miller (Trematoda: Allocreadiidae) of the stickleback, *Eucalia inconstans*. *Proc. Iowa Acad. Sci.* **62**: 638-639.
- Hopkins, S. H. 1934. The papillose Allocreadiidae. A study of their morphology, life histories, and relationships. *Univ. Ill. Bull.* **32**: 47-121.
- Krull, W. H. 1935. Studies on the life history of a frog bladder fluke, *Gorgoderina amplivava* Looss, 1899 (Trematoda: Gorgoderidae). *Papers Mich. Acad. Sci., Art and Letters* **20**: 697-710.
- Mackie, G. L. 1971. Some aspects of the distribution and ecology of macrobenthos in an industrialized portion of the Ottawa River near Ottawa and Hull, Canada. M.Sc. thesis, Univ. Ottawa, Ottawa, Ontario. 161 p. Available from Can. Theses on Microfilm, No. 10692, National Library of Canada, Ottawa.
- . 1973. Biology of *Musculium securis* (Pelecypoda: Sphaeriidae) in two temporary forest ponds, a river, and a permanent pond near Ottawa, Canada. Ph.D. thesis, Univ. Ottawa, Ottawa, Ontario.
- Mackie, G. L. and S. U. Qadri. 1973. Abundance and distribution of Mollusca in an industrialized portion of the Ottawa River near Ottawa-Hull, Canada. *Jour. Fish. Res. Board Can.* **30**: 167-172.
- Mackie, G. L., S. U. Qadri, and A. H. Clarke, Jr. 1976. Intraspecific variations in growth, birth periods, and longevity of four populations of *Musculium securis* (Pelecypoda: Sphaeriidae) near Ottawa, Canada. *Malacologia* **15**(2): in press.
- Meier-Brook, C. Untersuchungen zur biologie einiger *Pisidium* - Arten (Mollusca; Eulamellibranchiata; Sphaeriidae). *Arch. Hydrobiol. Suppl.* **38**: 73-150.
- Peters, L. E. 1955. Morphology of the adult and the miracidium of a progenetic species of *Allocreadium* from water beetles of the family Dystiscidae. *Jour. Parasit.* **41** (Sect. 2): 26.
- . 1957. An analysis of the trematode genus *Allocreadium* Looss with the description of *Allocreadium neotenicum* sp. nov. from water beetles. *Jour. Parasit.* **43**: 136-142.
- Rankin, J. S., Jr. 1939. The life cycle of the frog bladder fluke, *Gorgoderina attenuata* Stafford, 1902 (Trematoda: Gorgoderidae). *Amer. Midl. Naturalist* **21**: 476-488.
- Schell, S. C. 1967. The life history of *Phyllodistomum staffordi* Pearse, 1927 (Trematoda: Gorgoderidae Looss, 1901). *Jour. Parasit.* **53**: 569-576.
- . 1970. How to Know the Trematodes. Wm. C. Brown Co. Publ., Dubuque, Iowa. 355 p.
- Thomas, J. D. 1958. Studies on the structure, life history and ecology of the trematode *Phyllodistomum simile* Nybelin 1926 (Gorgoderidae: Gorgoderinae) from the urinary bladder of brown trout, *Salmo trutta* L. *Proc. Zool. Soc. London* **130**: 397-435.
- Wisniewski, W. L. 1958. The development cycle of *Bunodera luciopercae* (O. F. Muller). *Acta Parasit. Polon.* **6**: 289-307 (as cited by Anderson, Schell and Pratt, 1965).
- Wootton, D. M. 1957. Studies on the life history of *Allocreadium alloneotenicus* sp. nov. (Allocreadiidae — Trematoda). *Biol. Bull.* **113**: 302-315.

THE GENUS *EPIROBIA* IN CHIAPAS, MEXICO

Fred G. Thompson

Florida State Museum
University of Florida
Gainesville, Florida 32611

The genus *Epirobia* consists of small slender urocoptoid land snails that are found characteristically on limestone in wetter areas of eastern Mexico and northern Guatemala. The description of two new forms is presented so that they may be included in a report on the land mollusks of Chiapas by Allyn G. Smith. I wish to express my appreciation to him for allowing me to examine pertinent material in the collections of the California Academy of Sciences (CAS). Other material cited in this paper is deposited in the Florida State Museum, Uni-

versity of Florida (UF) and the Delaware Museum of Natural History.

***Epirobia swiftiana alternans* new subspecies**
Fig. 1, c and d. Fig. 2, a.

Shell. — Elongate fusiform-turreted, thin, translucent. Spire complete; upper $\frac{3}{4}$ of spire gradually tapering to the third or fourth from last whorl; shell 0.19-0.21 times as wide as long; narrowly umbilicated. Color light brown with alternating patches of white ribs. Whorls 19.5-20.5 (20.2 in holotype). Suture moderately impressed, not crenulate. Embryonic whorls 2.9-

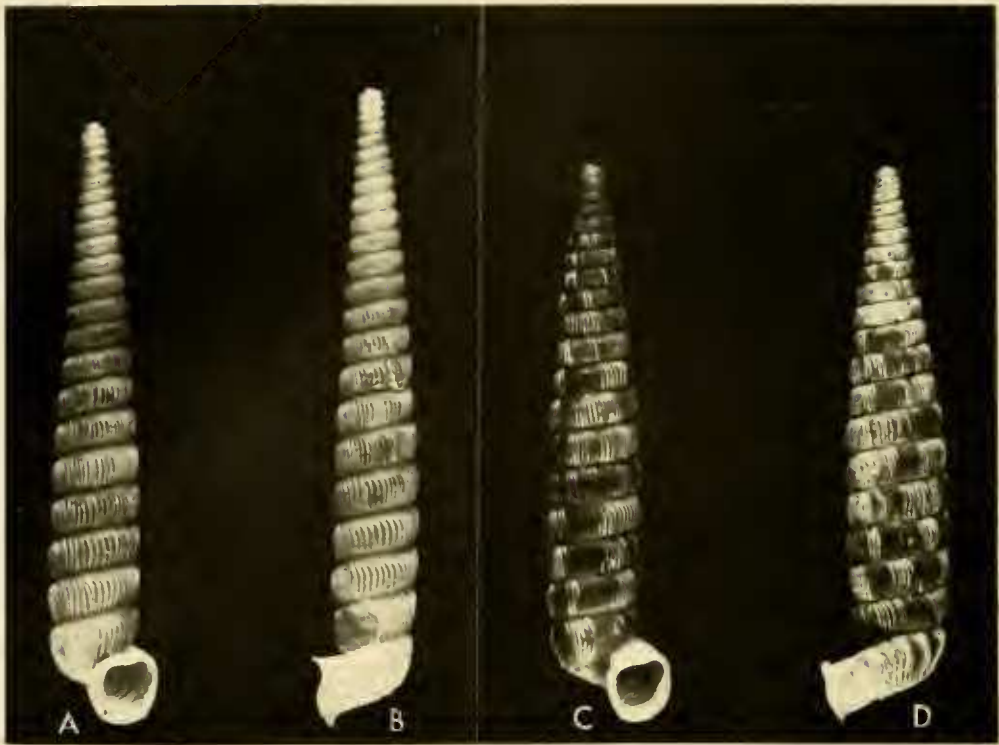


FIG. 1. *Epirobia lurida* new species. a, holotype 16.3 mm., b, paratype. *Epirobia swiftiana alternans* new subspecies. c, holotype. d, paratype.

3.4 (3.1 in holotype), relatively weakly arched, smooth and nearly equal in size. Following whorls nearly uniformly rounded at periphery, more so near sutures. Neck of last whorl rounded, below, without any indication of a basal keel. Whorls sculptured with clusters of narrow, graceful, sigmoid white ribs. Clusters separated from each other by nearly equally wide smooth zones. About 3-10 ribs per cluster and about 5-6 clusters per whorl on lower whorls. Ribs about half as wide as their intervals. Rib intervals and smooth zones light brown. Aperture free from preceding whorl, projecting forward and offset laterally. Aperture broadly ovate, slightly higher than wide, slightly oblique; about 0.60-0.69 times the width of the last whorl. Peristome white, moderately reflected, narrowest along posterior corner; widest along columellar margin. Axis hollow and about $\frac{1}{4}$ diameter of whorls. Axis weakly concave within each whorl; sculptured with weak, slightly oblique vertical ribs bearing small spines and nodes that are irregularly sized and spaced.

Measurements in mm of mature specimens

are as follows (measurements of the holotype are in parentheses): length, 13.0-14.2 (13.8; width, 2.6-2.8 (2.6); aperture height, 1.7-1.85 (1.8); aperture width, 1.6-1.8 (1.7). (14 specimens measured).

Type locality—Chiapas, 4.5 miles north of Jitotol, 5400 feet altitude HOLOTYPE: UF 22451; collected 6 July, 1965 by Fred G. Thompson. PARATYPES: UF 22452 (12); and Delaware Mus. Nat. Hist. 102474 (1) same data as the holotype. The type series was found in a thick cluster of moss growing on the side of a limestone ledge along a ravine. The area consisted of semi-wet mountain broadleaf forest which had been partially cut over.

Remarks—This subspecies differs from *E. S. swiftiana* (Crosse) by being shorter, having fewer whorls, more embryonic whorls and having a rounded base on the last whorl. *E. s. swiftiana* is about 18 mm long, has 21 whorls, including 1.5 embryonic whorls, and the last whorl is obsoletely subangulate below. The nominate subspecies is known only from the type specimen, which comes from an unspecified

locality (Crosse, 1863; 388-389, 1867: 200-201, pls. fig. 5. Fischer and Crosse, 1878: 407). It probably occurs in Chiapas, as does *E. s. alternans*.

***Epirobia lurida* new species**

Fig. 1, a and b. Fig. 2, b.

Shell — Elongate-turreted, very slender, 0.15-0.17 times as wide as long. Spire complete, uniformly increasing in diameter through the fourth from last whorl. Moderately thin, only slightly transparent when alive. Umbilicus narrowly perforate, visible from oblique view. Color light yellowish-gray, lusterless, dull, interior of aperture white. Whorls 22.5-25.0 (23.2 in holotype). Suture deeply impressed. Embryonic whorls 3.0-3.2 (3.1 in holotype), smooth, strongly arched peripherally with a deeply impressed suture; nearly equal in size. Following whorls gradually increasing in diameter through about the eighteenth whorl; sculptured with regularly spaced ribs. Ribs on lower whorls are about twice as high as wide, slope obliquely forward and are about one fourth as wide as their intervals. There are 35-49 ribs on penultimate whorls (38 in holotype). Ribs strongly arched in a reverse sigmoid curve. Periphery of postembryonic whorls strongly rounded on upper spire. Lower whorls flat sided and almost scalariform. The flattened periphery is slightly oblique to the axis of the shell. Base of last whorl round-

ed, without indication of a basal keel. Aperture free from preceding whorl, offset laterally and extended forward by about $\frac{1}{2}$ diameter of shell. Aperture broadly auriculate in shape; about 0.73-0.80 times width of shell; posterior corner narrowly rounded. Peristome moderately reflected; narrowest around posterior corner; widest along baso-columellar margin. Outer lip sigmoid in lateral profile, corresponding in outline to curvature of ribs on previous whorl. Plane of aperture slightly oblique to axis of shell. Axis hollow, about $\frac{1}{8}$ diameter of whorls, nearly straight, slightly twisted in lower whorls. Axis uniformly wide or slightly concave within each whorl; sculptured with small granular spines which tend to form oblique series.

Measurements in mm of mature specimens are as follows (measurements of the holotype are in parentheses); length, 15.5-18.3 (16.3); width, 2.4-2.7 (2.6); aperture height, 1.8-2.1 (2.0); aperture width, 1.8-2.1 (1.95).

Pallial organs — The pallial cavity is about 4 whorls long. The kidney is about $\frac{3}{4}$ whorl long, narrow, reniform sigmurethrous. The secondary ureter is about equal in diameter to the intestine and is tightly bound to the latter. The heart is about $\frac{1}{4}$ the length of the kidney. The aorta lies along the ventral margin of the lung and is weakly branched throughout most of its length. It divides into 5-6 small arterioles just behind the mantle collar.

Trophic structures — Jaw solid, arcuate. Salivary glands plumiform, appressed against the side of the esophagus; short, about half the length of the pharynx. Salivary ducts about half the length of the glands. Radular sac short, coiled in a loop against posterior end of pharynx. Radular formula 17-1-17 with the teeth lying in broadly accurate transverse rows about 390μ wide (Fig. 3, b-c). The central tooth is hexagonal in shape and has a large mesocone and a small ectocone on each side. The central is about 19μ high and 14μ wide. The transition from the laterals to the marginals occurs at the fifth through seventh rows. The laterals each bear a large blunt mesocone and a small ectocone. The mesocone of the seventh tooth and subsequent marginals is pointed where both the mesocone and the ectocone are bicuspid.

Muscular system — Columellar retractor long,

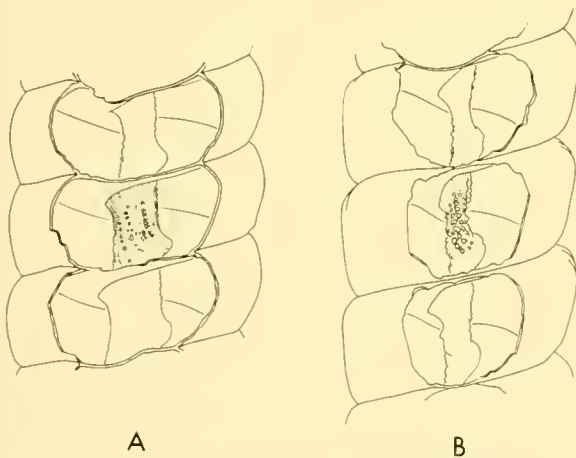


FIG. 2. Camera lucida drawings of the columellar structure in the penultimate whorls of a, *Epirobia swiftiana alternans* new subspecies and, b, *Epirobia lurida* new species.

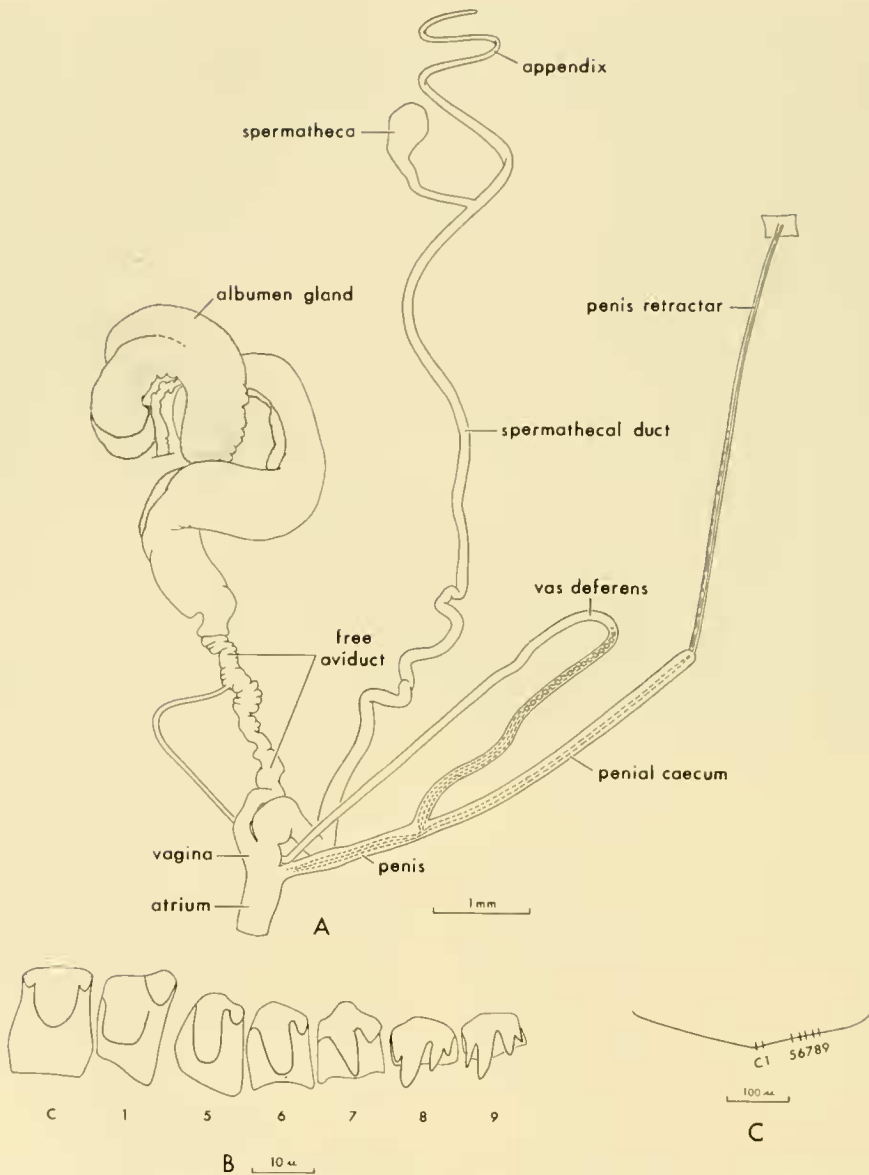


FIG. 3. *Epirobia lurida* new species. a, reproductive system exclusive of the gonad. b, radula. c, diagrammatic view of a transverse row of the radula showing the respective positions of the teeth illustrated in b.

extending seven whorls into spire; dividing at the third whorl to give rise to the pedal retractor basally, the pharyngeal retractor dorsally and the right and left ocular retractors laterally. The ocular retractors respectively give rise distally to the right and left labial retractors. The pharyngeal retractor divides into four narrow bands at base of pharynx. Two insert laterally and two insert basally.

Reproductive System (Fig. 3, a). — The genital

atrium is medium in length, moderately stocky and opens behind and below the right ocular tentacle. The right ocular retractor muscle passes through the penioviducal angle. The penis is long and slender, being about twice the length of atrium and has four longitudinal fleshy folds internally, one of which is larger than the others along the upper third of the penis. There is not verge. The apex of the penis bears a long slender compressed caecum which

is about twice the length of the penis. The penis retractor muscle is long and slender. It originates on the inner wall of the lung about $\frac{1}{2}$ whorl above the penis and inserts on the distal end of caecum. The vas deferens is relatively stocky above the penis and is weakly enlarged as an epiphallis for a distance about equal to the length of the penis. It enters the wall of the free oviduct below the prostate and oviduct. The spermathecal duct enters the free oviduct to form a short vagina immediately above the atrium. The base of the duct is enlarged into a thick-walled muscular bulb. The duct is branched distally. The spermatheca lies appressed against the outer base of the albumen gland. The spermathecal appendix lies along the columellar side of the oviduct and albumen gland. The free oviduct is about 1.5 times the length of the penis, is strongly convoluted and becomes moderately wide a little above the insertion of the spermathecal duct. The albumen gland lies about four whorls above the genital atrium and is strongly creased on its outer surface by the intestine. A talon and a carrefour are absent.

Type locality — Chiapas, 15.8 miles northwest of Ocozacoautla on road to Mal Paso, 2700 feet altitude. HOLOTYPE; UF 22449; collected 20 July, 1965 by Fred G. Thompson. PARATYPES UF 22450 (116); Delaware Mus. Nat. Hist. 102475 (5); same data as the holotypes; UF 22448 (4), CAS 55555 (30); topotypes, collected 6 October, 1974 by Dennis E. Breedlove. The type locality is an area covered by a heavy quasi-rainforest on low, rolling limestone hills. Live snails were found only on damp moss-covered limestone boulders.

Remarks — *E. lurida* is distinguished from other species of the genus by its flat sided whorls, its high sigmoid riblets and its slender straight-sided axis with granular spines arranged in irregular oblique rows. It is similar to *E. polygyra* (Pfeiffer) from Veracruz in general aspects of size, shape and whorl count, but the latter species has evenly rounded whorls, the riblets are fine threadlike striae and the axis is convex within each whorl with the rough granular sculpture confined primarily to the center of the convexity. *E. polygyrella* (von Martens) from Alta Verapaz has shorter, more

strongly rounded whorls, the aperture is nearly rotund, the axis has slender retracted riblets that lack granular sculpture and the shell is smaller.

DISCUSSION

There are seven species and two subspecies of *Epirobia* known. Three are recorded from Veracruz, four from Chiapas, one from Alta Verapaz, and one was described without any locality. For a review of the genus see Pilsbry, 1903: 59-66.

Three other snails that were described as species of *Epirobia* from northeastern Mexico are now placed elsewhere. *E. coahuilensis* Bartsch, 1906, has been referred to *Coelostemma* (*Apertaxis*) by Thompson (1971: 301) and *E. (Propilsbrya) nelsoni* Bartsch, 1906 was elevated to generic rank as *Propilsbrya nelsoni* by Pilsbry (1953: 136). The status of *E. (Gyrocion) mirabilis* Pilsbry, 1903a is problematic. It is known only from a single immature shell, and its generic status is questionable. Certainly *Gyrocion* is very different from *Epirobia* s.s.

Epirobia (s.s.) contains two species groups. One group, consisting of *E. berendti* (Pfeiffer), *E. b. albida* (Fischer and Crosse) and *E. gassiesi* (Pfeiffer), includes species that have relatively short obese shells. The second group, consisting of *E. s. swiftiana* (Crosse), *E. s. alternans* n. ssp., *E. apiostoma* (Pfeiffer), *E. polygyra* (Pfeiffer), *E. polygyrella* (v. Martens) and *E. lurida* n. sp., includes species that are relatively long and slender.

Previously two taxa were recorded from Chiapas, *E. b. albida* and *E. gassiesi*. Neither of these is known from a more exact locality than the state of Chiapas and both belong to a different species group than do the two new forms. *E. s. alternans* and *E. lurida* establish the first exact records of the genus within Chiapas. They come from an area forming more nearly a geographic continuum from Veracruz to Alta Verapaz for the species group to which they belong.

Epirobia is a member of the family Eucalodiidae, subfamily Holospirinae because of its non-decollate shell, solid jaw, trimorphic radular teeth, the presence of an appendix on the spermathecal duct, the absence of a verge

within the penis and the absence of a talon and a carrefour. It is unique among the eucalodiid genera for which the anatomy is known by having a long, slender, compressed penial caecum, a large muscular bulbous base on the spermathecal duct, the vas deferens entering the oviduct wall below the prostrate, and the mesocones and ectocones of the central and lateral teeth having large rounded cusps. Unfortunately anatomical information is not available on most other genera within the Holospirinae, and comparisons are not possible at present.

The above anatomical characterization of *Epirobia* is based exclusively on *E. lurida* because of a lack of data on other species. Strebel and Pfeffer (1880) describe and illustrate portions of the reproductive system and the radula recovered from a dried *E. apiostoma* (Pfeiffer). Pilsbry (1903: 60) expresses doubt about the identity of the radula. Strebel and Pfeiffer's description of the reproductive system are very different from that of *E. lurida*, to the extent that doubt about the identity of their material is even more warranted,

and comparisons involving *E. apiostoma* cannot be made at this time. It is possible that *Epirobia* is a compound genus based on shell convergences.

LITERATURE CITED

- Bartsch, P. 1906. The urocoptid mollusks from the mainland of America in the collection of the United States National Museum. *Proc. U.S. Nat. Mus.* 31: 109-160; pls. 3-5.
- Crosse, H. 1863. Diagnoses d'espèces nouvelles. *Journal de Conchyliologie* 11: 388-389.
1867. Descriptions d'espèces nouvelles. *Journal de Conchyliologie* 15: 195-203; pl. 4, figs. 1, 4; pl. 5, figs. 2-5.
- Fischer, P. and H. Crosse 1878. *Mission Scientifique au Mexique et dans L'Amérique Centrale*. Mollusques terrestres et fluviatils. Paris, 1: 1-702; pls. 1-20.
- Pilsbry, H. A. 1903. *Manual of Conchology*; Ser. 2, 15: 1-323; pls. 1-65 1903a. Mexican land and freshwater mollusks. *Proc. Acad. Nat. Sci. Phila.* 55: 761-792; pls. 47-54.
1953. Inland Mollusca of northern Mexico. II. *Proc. Acad. Nat. Sci. Phila.* 105 133-167; pls. 3-10.
- Strebel, H. and G. Pfeffer 1880. *Beitrag zur Kenntniss der Fauna Mexikanischer Land- und Süsswasser-Conchylien*. IV. Hamburg. 1-112; pls. 1-15.
- Thompson, F. G. 1971. Some Mexican land Snails of the genera *Coelostemma* and *Metastoma* (Urocoptidae). *Bull. Fla. State Mus.* 15: 267-302.

A NEW SPECIES OF *CALLISTOCHITON* IN THE CARIBBEAN

Antonio J. Ferreira¹

2060 Clarmar Way
San Jose, California 95128

ABSTRACT

A new species of chiton, Callistochiton portobelensis Ferreira, sp. nov., is described and figured. Found at Portobelo, Panama (type locality) and off Key West, Florida, it closely resembles C. elenensis (Sowerby) from the eastern Pacific.

In the Caribbean, the genus *Callistochiton* (Carpenter in Dall, 1879) has been thought to be represented by a single species, *Callistochiton shuttleworthianus* Pilsbry, 1893. In February 1975, while on a collecting trip to the Caribbean shores of Panama, I came across several specimens of what subsequent investigation proved to be an undescribed species of *Callistochiton*.

Class Polyplacophora de Blainville, 1816
Subclass Neoloricata Bergenhayn, 1955
Family Callistoplacidae Pilsbry, 1893

***Callistochiton portobelensis* new species**

Figs. 1-6

Diagnosis — Chiton small, less than 1 cm long, greenish cream color. Anterior valve with about 12 subdued radial ribs; posterior valve with none or a few obsolete radial ribs. Mucro

¹ Research Associate, California Academy of Sciences.